INFORMATION DISCLOSURE STATEMENT

The Office states the Information Disclosure Statement filed on July 14, 2004 fails to comply with 37 CFR 1.98(a)(2) which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. In response, Applicant respectfully submits an Information Disclosure Statement in support of this objection.

ABSTRACT

The Abstract of the disclosure was objected to because line 2, "comprising" should read –including-. In response, a revised Abstract is enclosed and shows the word "including" instead of the word "comprising" in line 2.

REMARKS

Claims 1-15 were presented for examination. Claims 1-15 were rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In response, the field of the invention is seismic prospecting. Independent claims are drawn to methods of processing series of seismic data for extracting information about the geology of the subsoil. Seismic data series are obtained by propagating seismic waves through the subsurface by means of seismic sources and picking up, by means of seismic sensors, signals resulting from reflections of seismic waves by the subsurface in the area being explored.

Seismic data series thus obtained relate to this specific subsurface area and bear information about the geometry and properties (that is the geology) of this subsurface area. This real-world information is present in the raw seismic data series produced by the sensors, and processing

methods such as the claimed methods improve the quality of the raw seismic data series, especially by filtering out noise components, and allow outputs such as a resolution of these seismic data series to be deduced from the raw seismic data series, said resolution being used for determining the topography of the subsoil.

What this implies is that seismic data series in whatever form, including raw data series as produced by sensors and processed data series wherein noise component have been filtered out, are intrinsically technical, simply because they are real world data bearing information about the geology of the subsoil. Those seismic data are physical entities.

In order to eliminate unwanted noise components in seismic data series, and to obtain precise and reliable information about the geology of the subsoil, one conventionally implements kriging analysis (application at p.1, l.5 to 12).

Kriging analysis allows extracting from a seismic data map of the type shown in figure 1 (raw experimental data) firstly the white noise that is present in the data (figure 2a), secondly noise corresponding to linear lines (figure 2b), and finally filtered seismic data cleared of both these kinds of noise (figure 2c) (see application at p.1, l.27-32).

In this context, the invention relates to a new method using kriging analysis, said method allowing for filtering out noise components in seismic data series (see paragraph [0047] and [0051]) so that useful information about the geology of the subsoil can be clearly identified and interpreted. Thus, the methods defined in new claims 1 to 7 relates to the processing of physical entities and cannot be considered as an abstract idea algorithm process.

Furthermore, it is considered that the methods as claimed in claims 1 to 7 are sufficient to constitute a tangible result since a practical application is disclosed at page 6 line 21 to page 7 line 27 and illustrated on figures 4 to 6 wherein:

- figure 4 shows an estimate of the component that is common to the two seismic data series illustrated in figures 3a and 3b (p.6, l.22-24),

- figures 5a and 5b show white noise estimated for the two seismic data series illustrated in figures 3a and 3b (p.7, l.24-27),

- figures 6a and 6b show linear line noise estimated for the two seismic data series illustrated in figures 3a and 3b (p.7, l.24-27).

Moreover, examples of error measurements obtained by standard filtering, by kriging analysis, and by the method of the present invention (co-kriging analysis) are illustrated by the graphs of figures 7a to 7b (see application on page 7, lines 28-31).

These figures (7a to 7c) clearly show that the method of the present invention:

- allows obtaining better results, and

- allows obtaining dispersions that are much more smaller than those obtained with the filtering methods of the state of the art (see application, p.7, l.32-36).

Thus a tangible result of the claimed method is clearly disclosed in the present application. Consequently, Applicant considers that new claims 1 to 7 satisfy 35 U.S.C 101. Therefore, claims 1-15 should be in allowable form.

Claims 1-15 were rejected under 35 U.S.C. §102(b) as being anticipated by "Ordinary Cokriging Revisited", by Goovaerts ("Goovaerts"). In response, Goovaerts discloses three cokriging variants: (1) simple cokriging, (2) ordinary cokriging, and (3) rescaled ordinary cokriging. It is considered in the final office action that the method as defined in new claim 1 is anticipated by the simple cokriging variant described at pages 22-25 of Goovaerts.

Particularly, the examiner considers that the step of *"determining an estimate of the component that is common to the data series"* defined in claim 1 is anticipated by the estimator Z^*_{SCK} defined in equation 1 of Goovaerts.

The estimator Z^*_{SCK} is obtained using primary and secondary attributes Z1, Z2 and can be written as follows:

$$Z^*_{SCK}(u) - m1 = \sum_{\alpha 1=1}^{n1(u)} \lambda_{\alpha 1}^{SCK}(u)[Z_1(u_{\alpha 1}) - m1] + \sum_{\alpha 2=1}^{n2(u)} \lambda_{\alpha 2}^{SCK}(u)[Z_2(u_{\alpha 2}) - m2] \quad (1)$$

This estimator of Z^*_{SCK} take into account the fact that the secondary attribute Z2 can be measured at possibly different locations from the primary attribute Z1.

The simple cokriging method of Goovaerts does not anticipate the method defined in claim 1. Indeed, the estimator Z^*_{SCK} defined in equation (1) of Goovaerts cannot be considered as an estimate of the part that is common to two data series Z1, Z2 for the following reasons:

a. It is mentioned at **page 22, line 31** of Goovaerts that the estimator **Z^*_{SCK} is an estimator of Z1** (and not an estimator of the part common to Z1 and Z2).

b. Equation (1) of Goovaerts only teaches that the estimator Z^*_{SCK} of Z1 is a function of the primary attributes Z1 and of the secondary attribute Z2.

c. As described in the present application, the step of determining an estimate of the part that is common to the data series Z1 and Z2 comprises the sub-step of determining a cross variogram of the data series Z1 and Z2:

$$\gamma_{12}(h) = \frac{1}{N}\sum(Z1(x) - Z1(x+h))(Z2(x) - Z2(x+h))$$

Such sub-step is not described in Goovaerts, because the estimator Z^*_{SCK} is an estimator of Z1 and not an estimator of the part that is common to Z1 and Z2.

d. The simple cokriging method of Goovaerts assigns zero weights to secondary data when primary and secondary attributes Z1, Z2 are measured at the same locations, as mentioned at page 34, § Remarks.

Thus, in Goovaerts, when primary and secondary attributes Z1, Z2 are measured at the same locations, the estimator Z^*_{SCK} can be rewritten as follows:

$$Z^*_{SCK}(u) - m1 = \sum_{\alpha 1=1}^{n1(u)} \lambda_{\alpha 1}^{SCK}(u)[Z_1(u_{\alpha 1}) - m1]$$

Hence the estimator Z^*_{SCK} is only a function of Z1, when Z1 and Z2 are measured at the same locations. This shows that Z^*_{SCK} is an estimator of Z1.

e. The fact that Z^*_{SCK} is an estimator of Z1 also appears from the error variance equation mentioned at page 23, third paragraph since this error variance does not comprise any terms relative to Z2:

$$\sigma_u^2 = Var\{Z_{SCK}^{(1)*}(u) - Z_1(u)\}$$

In view of point a to e, equation (1) of Goovaerts does not teach nor suggest determining an estimate of the component that is common to the data series Z1, Z2. Consequently, the method as defined in claim 1 is new in view of Goovaerts. The method of the present invention is further neither taught nor suggested in Goovaerts which only shows the prediction performance differences between three cokriging variants. Please note that equation 1 of Goovaerts only teaches that the estimator Z^*_{SCK} of Z1 is a function of Z1 and Z2.

By asserting that the estimator Z^*_{SCK} of equation 1 is the estimate of the part that is common to the primary and secondary data Z1, Z2 (see page 7 last sentence of the final office action), the examiner:

- extends the teaching of equation 1,
- occurs the rest of the description of the simple cokriging method which clearly supports the fact that Z^*_{SCK} is an estimator of Z1.

Therefore, claims 1-15 should be in allowable form.

In commenting on the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between same and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the prior art and applicant's present invention have been made by applicant. For the foregoing reasons, applicant reserves the right to submit additional evidence showing the distinction between applicant's invention to be unobvious in view of the prior art.

The foregoing remarks are intended to assist the Office in examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention which are rendered patentable, being only examples of certain advantageous features and differences which applicant's attorney chooses to mention at this time.

The Office is authorized to charge the petition fee and any other fees or credit any overpayment for this matter to the Deposit Account of Adams and Reese, LLP, Account No. 50-2413.

Reconsideration of the application as amended and allowance thereof is requested.

Please send all future correspondence regarding the above-referenced application to the undersigned at the address appearing below.

Respectfully submitted,

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